

Investigation of Mechanical, Thermal and Third Order Nonlinear Optical Properties of L-Alanine Cadmium Chloride Single Crystal

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Abstract : The L-alanine cadmium chloride (LACC) nonlinear optical (NLO) material was synthesized and the single crystals were grown by slow evaporation solution growth technique at room temperature. The unit cell parameters and morphology of the grown single crystal has been determined by single crystal XRD. The various functional groups present in the LACC was identified and confirmed by FTIR analysis. The optical properties of the LACC were determined by UV-Vis spectral studies and the band gap energy was calculated (5.2 eV). The photoluminescence spectrum of LACC was analyzed and it shows the maximum emission of violet light in the visible region. The TG/DTA analyzes were performed to determine the thermal stability and the melting point of the LACC was measured as 141°C. The microhardness measurement was carried out using Vicker's hardness tester on (100) plane to find out the Meyer's index number (n). The second harmonic generation (SHG) efficiency measurement was carried out using Kurtz and Perry technique and third order nonlinear optical susceptibility (χ^3) was measured by Z-scan technique (4.09×10^{-6} esu). The laser damage threshold of LACC has been determined (67.142 GW/cm^2) using Nd:YAG laser.

Keywords : Single crystal, energy gap, microhardness, photoluminescence, (χ^3) measurement.

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